Module 9 - Strain Gauges

ME3023 - Measurements in Mechanical Systems

Mechanical Engineering

Tennessee Technological University

Topic 3 - P3500 Strain Indicator

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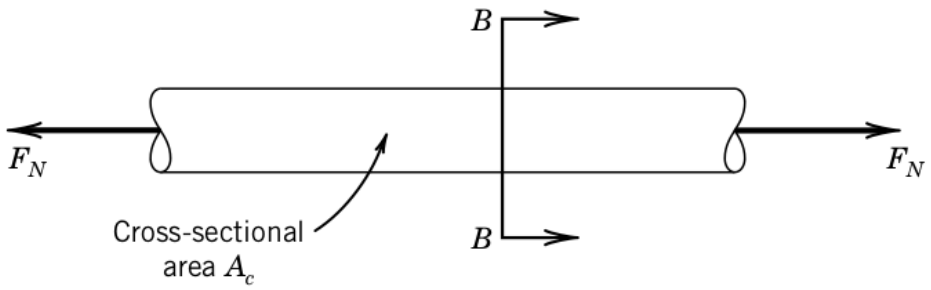
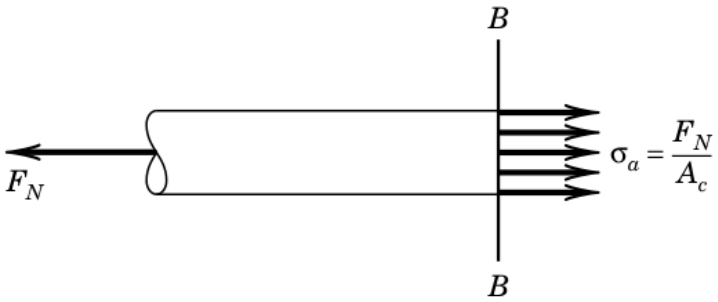
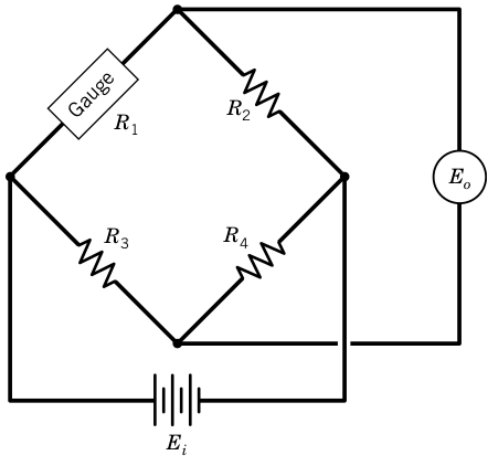
- Units of Microstrain
- Quarter, Half, and Full Configurations
- Wiring the P3500
- Operating the P3500
- Modern Solution

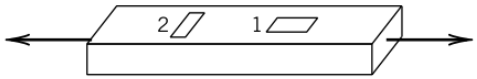
Units of Microstrain

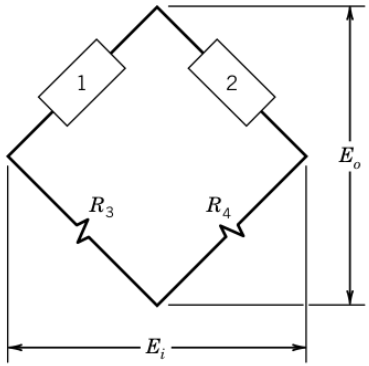


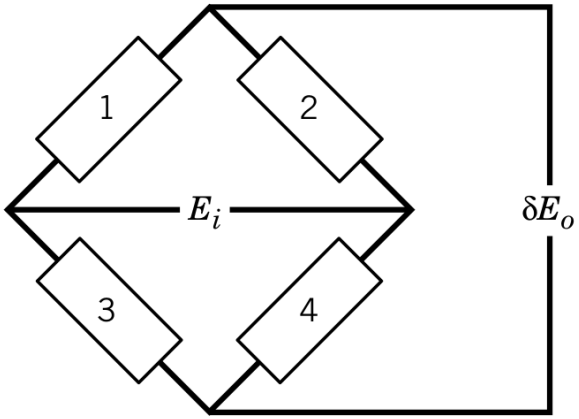


Quarter, Half, and Full Configurations

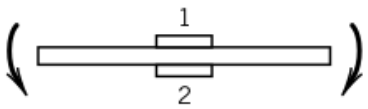
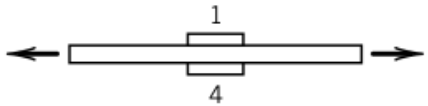
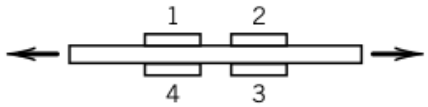
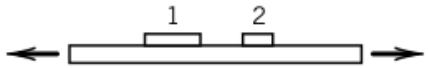
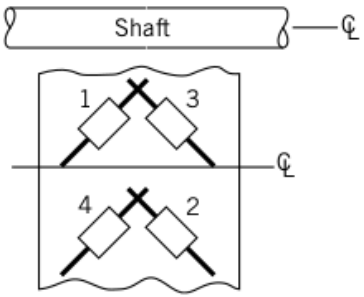




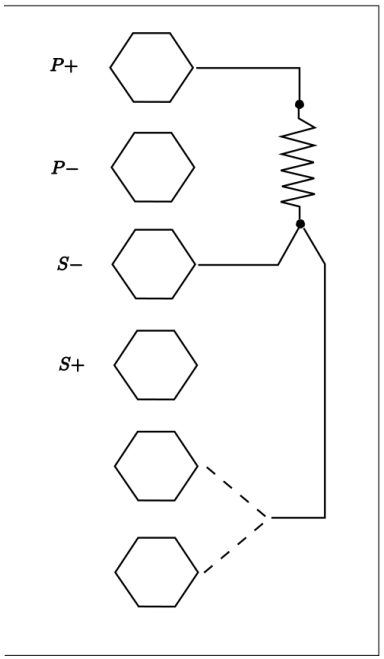


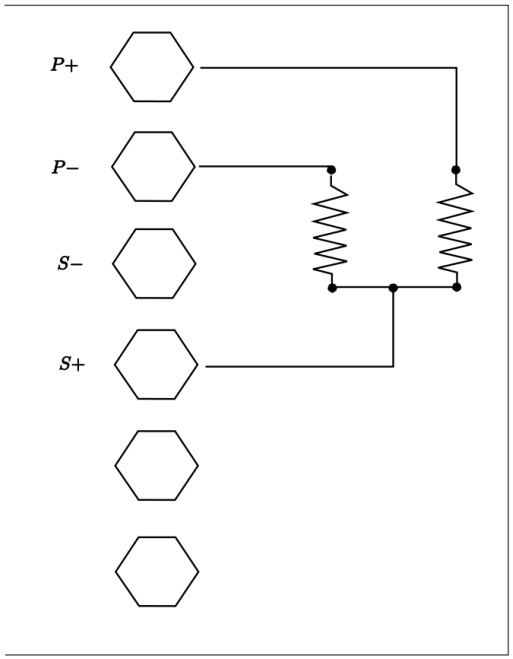


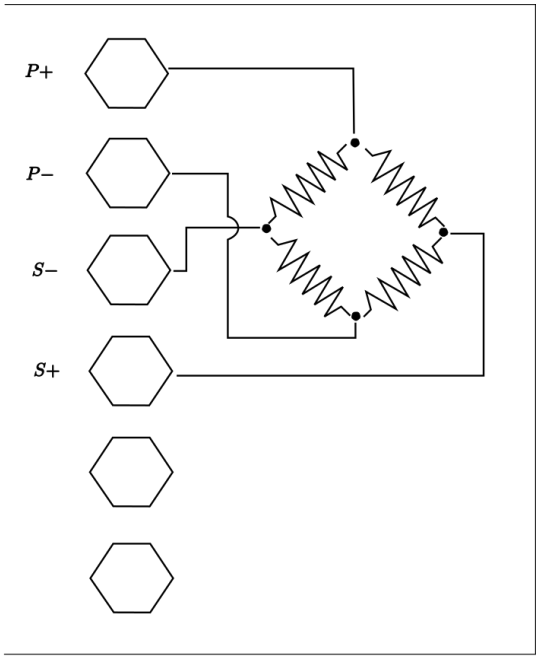
Quarter, Half, and Full Configurations

	Arrangement	Compensation Provided	Bridge Constant κ
	Single gauge in uniaxial stress	None	$\kappa = 1$
	Two gauges sensing equal and opposite strain—typical bending arrangement	Temperature	$\kappa = 2$
	Two gauges in uniaxial stress	Bending only	$\kappa = 2$
	Four gauges with pairs sensing equal and opposite strains	Temperature and bending	$\kappa=4$
	One axial gauge and one Poisson gauge		$\kappa= 1 +\nu$
	Four gauges with pairs sensing equal and opposite strains—sensitive to torsion only; typical shaft arrangement.	Temperature and axial	$\kappa = 4$

Wiring the P3500







Operating the P3500

- The instructions are on the unit.
- The balancing process is completed after changing any wiring.

Modern Solution

- The P3500 is old technology, but still does not mean it is bad. I have used them myself and they work great.
- The manufacturer *Vishay Group* has a *more* modern solution with DAQ and multiple channels.
- There are a variety of low cost options available but be careful.
  - Sparkfun - strain gauge basics
  - Robot Shop
  - elecrow